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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/526,916

03/07/2005

Yasuhiro Omori

JFE-05-1032

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EXAMINER

YANG, JIE

ART UNIT

PAPER NUMBER

1709

MAIL DATE

DELIVERY MODE

07/25/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/526,916

Applicant(s)

OMORI ET AL.

Examiner

Jie Yang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 3/7/2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 March 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 10/26/2006; 03/07/2005.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Information Disclosure Statement

Regard foreign references: JP5-65592A; JP7-118791A; JP9-111401A; JP9-241745; JP10-36937A; GB2345116A; and JP2004-27334 listed in IDS marked 03/07/2005, they are not considered and marked out from present information disclosure statement (IDS) complying with 37 CFR 1.98 because they are not included in the application. 37 CFR 1.98(a)(2) requires a legible copy of: (1) each foreign patent; (2) each publication or that portion which caused it to be listed; (3) for each cited pending U.S. application, the application specification including claims, and any drawing of the application, or that portion of the application which caused it to be listed including any claims directed to that portion, unless the cited pending U.S. application is stored in the Image File Wrapper (IFW) system; and (4) all other information, or that portion which caused it to be listed. In addition, each IDS must include a list of all patents, publications, applications, or other information submitted for consideration by the Office (see 37 CFR 1.98(a)(1) and (b)), and MPEP § 609.04(a), subsection I. states, "the list ... must be submitted on a separate paper." Applicant is advised that the date of submission of any item of information or any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the IDS, including all "statement" requirements of 37 CFR 1.97(e). See MPEP § 609.05(a).

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Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-12, and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ochi et al (US 6,602,358, thereafter '358) in view of Ochi et al (US 6,660,105 B1, thereafter '105).

Regard to claim 1, '358 teaches a steel performed by induction hardening treatment (Col.2, Line 23-42) with a composition (Claim 1 and 3 of '358) as shown in the following table.

The examiner notes that the ranges disclosed by '358 significantly overlap the composition range of alloy recited in instant claim, which is a prima facie case of obviousness. See MPEP 2144.05.I. It would have been obvious to one of ordinary

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skill in the art to select the claimed induction hardening steel alloy composition from the induction hardening steel composition disclosed by '358 because '358 discloses the same utility throughout the disclosed ranges.

'358 discloses an induction hardening steel as shown above, but '358 does not specify wherein the structure of bainite and/or martensite with total volume fraction being 10% or more.

'105 teaches a case hardening steel having good grain coarsening properties during carburization with a composition overlaps the major composition range of alloy recited in instant claim (claim 1, 5 and 8 of '105). '105 teaches in example 4, over 10% (10-20%) bainite fraction after rolling had been obtained (Table 5 of '105). Compared with instant application, '105 performs similar induction hardening on similar composition alloy and this alloy used for same application, for example, rolling parts, shaft, and constant velocity joint parts (Col. 1, line 16-43). The prima facie obviousness is rendered. Therefore, it would have been obvious to one of ordinary skill in the art to choose heat treatment process for steel more than 10% bainite and/or martensite microstructure as demonstrated in '105 because the steel of '105 overlap composition range of alloy recited in instant claim and are suitable for induction hardening in the process of '358.

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Concluding above discussions, claim 1 is rendered obvious by above references.

Element	From instant Claims (in wt%)	'358 (in wt%)	Overlapping range (in wt%)
For claim 1		See claims 1, 3	
C	0.35-0.7	0.45-0.59	0.45-0.59
Si	0.30-1.1	0.15 -0.4	0.30-0.4
Mn	0.20-2.0	0.15-0.45	0.2-0.45
Al	0.005-0.25	0.015-0.05	0.015-0.05
Ti	0.005-0.1	0.015 -0.03	0.015 -0.03
Mo	0.05-0.6	0.1-0.35	0.1-0.35
B	0.0003-0.006	0.0005-0.005	0.0005-0.005
S	0.06 or less	0.005-0.15	0.005-0.06
P	0.02 or less	0.02 or less	0.02 or less
Cr	0.2 or less	0.1 or less	0.1 or less
Fe	Balance	Balance	Balance
For claim 2		'105 See Cl.1,5,8	
Cu	1.0 or less	--	--
Ni	3.5 or less	0.1-3.5	0.1-3.5
Co	1.0 or less	--	--
Nb	0.1 or less	0.022-0.04	0.022-0.04

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Regard to claim 2, which depended on claim 1, '358 and '105 teach the limitation for claim 1. But '358 does not specify wherein at least one element from group of Cu; Ni; Co and V is added in the alloy. '105 teaches adding 0.1-3.5% Ni and 0.03-0.5% V in hot rolled case hardening steel. These composition ranges overlap that claimed in instant claim. '105 also points out: "Ni is another element that is effective for imparting strength and hardenability to the steel..." (Col.7, Line 19-24); and "V is another element that is effective for imparting strength and hardenability to the steel..." (Col.7, Line 25-32). Therefor, it would have been obvious to one of ordinary skill in the art to choose suitable amount of at least one from group of Cu, Ni, Co, and V as demonstrated in '105 in the process of '358. Refer to the rejection for claim 1, claim 2 is rendered obvious by above references.

Regard to claim 3, which depended on claim 1 and Claim 5, which depended on claim 2, '358 and '105 teach the limitation for claims 1 and 2. But '358 does not specify wherein "the prior austenite grain size ...is 12 μm or less...". '105 teaches a case hardening steel having good grain coarsening properties (Col.1, Line 10-13) and especially, the examples (No.1-6) in tables 2-5,

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7-9 have austenite grain sizes less than 12 μ m. Refer to the rejections for claims 1 and 2, claims 3 and 5 are rendered obvious by above references.

Regard to claim 4, which depended on claim 1 and Claim 6, which depended on claim 2, '358 and '105 teach the limitation for claims 1 and 2. '358 also shows the induction hardening depth can reach to 4.6 to 5.7mm (Fig.4 of '358). Claims 4 and 6 are rendered obvious by above references.

Regard to claim 7, which depended on claim 1, and Claim 8, which depended on claim 2, '358 and '105 teach the limitation for claims 1 and 2. But '358 does not specify wherein cooling the hot worked steel at a cooling rate of at least 0.2°C/s. '105 teaches: " after rolling, the steel was cooling from 800 °C to 500 °C at a rate of 0.2 to 1.5 °C/s" (Col.12, Line 52-67). Refer to the rejections for claims 1 and 2, claims 7 and 8 are rendered obvious by above references.

Regard to claims 9 and 11, which depended on claim 7 and Claim 10 and 12, which depended on claim 8, '358 and '105 teach the limitation for claims 7 and 8. But '358 does not specify wherein to induction hardening at least once, wherein the heating temperature of final induction hardening is 800-1000 °C. '105 teaches such limitation, for example, hardening after hot rolling at 930-950 °C (example 1 and table 2); Quench-hardened at

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900 °C by reheating (example 5, and table 8). Because above hardening temperature in the range of temperature recited by instant claims. Claims 9-12 are rendered obvious by above references.

Regard to claims 17-20, which depended on claim 9-12 separately, '358 and '105 teach the limitation for claims 9-12. '358 also shows the induction hardening depth can reach to 4.6 to 5.7 mm (Fig.4 of '358). Claims 17-20 are rendered obvious by above references.

Claims 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over '358 in view of '105 as applied in claims 1-12, 17-20 and further in view of Kurebayashi et al (JP 10036937, thereafter 'JP937).

Regard to claims 13 and 16, which depended on claims 9-12 separately, '358 and '105 teach the limitation for claims 9 -12. But '358 does not specify wherein the heating time of the final induction hardening is 5 seconds or less. 'JP937 teaches an induction-hardened steel for automotive power transmission system parts allocation with a composition overlaps the major composition range of alloy recited in instant claim (Abstract, table 1 of 'JP937). 'JP937 teaches: high frequency hardening was made into the frequency of 10kHz, 55kW of output, and cooking time 2 seconds ('JP937 translation paragraph [20]); 1.5 seconds

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('JP937 translation paragraph [22]); and 4 seconds ('JP937 translation paragraph [25])). All the operation time is less than 5 seconds and the induction hardening depth reached from 3.2 to 7.8 mm (Table 2 of 'JP937). 'JP937 also teaches: the hardening depth ratio (t/r) is shallower compared to comparative example steel at less than 5 seconds high frequency hardening. Even the surface hardness is high, since the hardening depth is shallow, static torsion torque shows the low value and fracture life in fatigue testing is long ('JP937 translation paragraph [25], [26])). Compared with instant application, 'JP937 performs similar induction hardening on similar composition alloy and this alloy used for same application as pointed out above. The prima facie obviousness is rendered. Therefor, it would have been obvious to one of ordinary skill in the art to choose less than 5 seconds high frequency hardening process to get excellent in impact bendability and impact twisting resistance properties (abstract of "JP937) in the process of '358.

Conclusion

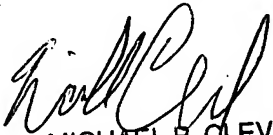
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jie Yang whose telephone number is 571-270-1884.

The examiner can normally be reached on M-F, 7:30-5:00 EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


MICHAEL B. CLEVELAND
SUPERVISORY PATENT EXAMINER/JY

